CITY OF TEMPE

Respiratory Protection Program - 2006

Revised

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2004
2006

Program Review

This program has been reviewed by the following City of Tempe employees.

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Respiratory Protection Program

Purpose

The intent of this Respiratory Protection Program is to provide guidance in establishing respiratory protection for all City of Tempe employees. The Environmental Health and Safety Section will coordinate the establishment of the City's respiratory protection policy, administer the City's written Respiratory Protection Program, provide or coordinate training, perform fit testing and all applicable record keeping requirements. OSHA's Respiratory Protection Standard, 29 CFR 1910.134 establishes specific guidelines to help protect employees from airborne contaminants.

This program provides standardized procedures to protect the health and safety of City of Tempe employees that use respiratory protection equipment. No City of Tempe employee will wear respiratory protective equipment until authorized by the Program Administrator *(Exception Sworn Fire Department Personnel).*

In several instances throughout this program exceptions are identified for Sworn Fire Department Personnel and SIB elements of the Tempe Police Department. This exemption is based on written Departmental polices, extensive training and competencies that these groups must exhibit on a daily basis.

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Chapter 1

Roles and Responsibilities

EH&S Group

The City's Industrial Hygienist, within the Water Utilities Department, Environmental Health and Safety Group is the designated Program Administrator and will oversee the implementation of the overall program. The Program Administrator will ensure that the City's Respiratory Protection Program covers specific work operations and practices in the workplace. The Hazardous Materials and Safety Specialist will act on behalf of the Program Administrator in circumstances where the Program Administer designates or in his/her absence.

The Environmental Health and Safety Group (EH&S) will assist the Program Administrator in all aspects of the program. The Program Administrator may designate additional city staff within Departments to serve as Departmental Program Administrators (DPA) to assist the City's Industrial Hygienist. These individuals must have both the appropriate training and experience to help administer the City's respiratory protection program and assist in the required evaluations of program effectiveness.

The Environmental Health and Safety (EH&S) Group is responsible for identification of hazardous atmospheres that an employee may be exposed to and make a reasonable estimate of the employee exposure in determining the appropriate respirator for employees to use. It also oversees the Respiratory Protection Program administration including conducting the annual program evaluation, identifying respirator users and approving appropriate respirator types, scheduling respirator training, fit testing and maintaining records associated with this program. The Program Administrator will assist in the coordination of medical evaluations.

Departmental Program Administrator

Departmental Program Admistrators (DPA) must have the appropriate knowledge, training and be approved by the Program Administrator. DPA's will serve as a liaison for individual Departments and the Program Administrator. DPA will maintain a list of individuals who wear respiratory equipment (voluntary included) and ensure that they meet all the requirements defined in this program.

Department Responsibilities

Each Department/Division within the city is responsible for requesting assessments when there is concern or the need for respiratory protection. Each Department/Division within the city ensuring that the specific procedures regarding the use of respiratory protection equipment in areas the Program Administrator has identified with actual or potential atmospheric hazards are properly followed. This includes the proper use of all forms of personal protective equipment (PPE), in addition to respirators. Each Department/Division is responsible for purchasing respiratory protective equipment, personal protective equipment and monetary cost associated with medical clearance.

Each Department/Division is responsible for providing appropriate storage, maintenance, and inventory of all safety equipment. Equipment requiring routine maintenance and calibration must be maintained and calibrated by the Department/Division or sent back for repair on a periodic basis for such services. Equipment as it applies to this program must be maintained and repaired by certified technicians **ONLY**.

Supervisors' Responsibilities

Supervisors will ensure that every employee has appropriate personal protective equipment required to safely perform their work assignments. They will identify employees in their work groups that have the potential to work in or near hazardous atmospheres. Supervisors are responsible for ensuring that only employees who have met the requirements of this program use respiratory equipment. Supervisors will conduct periodic checks of their work areas to make sure that employees are using their respirators in accordance with the City's Respiratory Protection Program procedures.

Employees' Responsibilities

Employees are required to promptly notify their supervisor of any hazardous working condition, improperly working safety equipment or instrument. Employees are expected to follow this program. Employees are responsible for properly using the safety equipment issued to them and ensuring that all equipment is in good working order before using it. Employees will use the required safety equipment in the correct manner, including testing, decontaminating, and storing the equipment.

Employees are required to promptly notify their supervisor of any hazardous working condition, and any improperly working safety equipment or instrument.

Location and Availability of Program

A copy of the written program is available for employee review from the administrative office of each department, from DPA's, or from the Environmental Health and Safety Group. The City will provide a copy of this written program to each employee during Respiratory Protection training. In addition, the written program will be made available to all employees on the City of Tempe's internal (intranet) site.

Chapter
2

Intro to Respiratory Protection

Respiratory protection is of great importance since inhalation is the primary route of industrial exposures to hazardous substances. Breathing biological hazards, gases, vapors or particulates, such as dusts, fumes, mists or aerosols, can result in severe adverse health affects. Oxygen is a vital life-giving component of the human body. Cells in the body cannot survive very long without it, especially the brain and heart. When an individual breathes in, air passes through the body's respiratory system into the lungs, which are comprised of millions of clusters of small air sacs, called alveoli. It's at the alveoli that essential gas exchange occurs. The alveoli are separated from the capillaries by thin cell walls that are permeable to gases. Oxygen passes into the bloodstream and carbon dioxide waste products are exhaled out of the body at this point. Depending on the nature and size of the contaminant, it can cause an adverse health effect anywhere along this journey.

Airborne contaminants can cause tissue irritation and/or damage or get absorbed into the blood stream without even entering the lungs. They can be absorbed directly into the body through the skin and/or through a punctured eardrum. They can displace oxygen in confined spaces creating an oxygen-deficient atmosphere or inhibit the body's ability to take-up oxygen once it is breathed into the lungs.

Airborne Contaminants

Inhaled contaminants that adversely affect the lungs fall into three (3) general categories:

- Aerosols and dusts, which, when deposited in the lungs, can cause tissue damage, tissue reaction, disease, or physical obstruction. An example is asbestos fiber, which causes a fibrotic growth that narrows the ducts or limits the effective area of the alveolar lining where oxygen exchange occurs with the bloodstream.

- Toxic gases that produce adverse reaction in the tissue of the lungs themselves. Examples include chlorine and hydrogen fluoride that can irritate the mucous membranes causing chemical burns.

- Toxic aerosols or gases that do not affect the lung tissue, but are passed from the lung into the bloodstream, where they are carried to other organs or have adverse effects on oxygen-carrying capacity of the bloodstream. Examples include mercury and carbon monoxide, respectively.

Exposure Control Priority

It is important to remember that OSHA prefers the use of ***engineering controls*** such as mechanical ventilation, use of less toxic materials and isolation of specific atmospheric hazards. Respiratory protection should only be used as a ***last*** resort.

Engineering and work practice controls are generally regarded as the most effective methods to control exposures to airborne hazardous substances. OSHA considers the use of respirators to be the least satisfactory approach to exposure control. The following items should be considered before respiratory protection is used:

- Respirators provide adequate protection only if employers ensure, on a constant basis, that they are properly fitted and worn.

- Respirators protect only the employees who are wearing them from a hazard, rather than reducing or eliminating the hazard from the workplace as a whole (which is what engineering and work practice controls do).

- Respirators are uncomfortable to wear, cumbersome to use, and interfere with communication in the workplace, which can often be critical to maintaining safety and health.

When is Protection Necessary

The human senses - sight, smell, and taste – are not always capable of detecting the presence of airborne contaminants. Some have no taste or odor, while others are lethal at concentrations below the point you can detect them. Others, such as hydrogen sulfide, cause olfactory fatigue, a condition where a person can no longer smell the substance even though it is still present. Certain airborne chemicals such as gases, vapors, mists and dust particles, can have a toxic effect on unprotected workers, especially when working in a confined space.

While the human respiratory system is able to tolerate limited exposures to toxic gases, vapors, and particulates, care must be taken to eliminate or control these hazards. Detection of these airborne contaminants requires the use of atmospheric monitoring devices.

Respiratory Protection must be used when:

- The level of an airborne contaminant is unknown;
- The contaminant is known and exceeds the established permissible exposure limit; or
- The oxygen level is insufficient, less than 19.5%.
- Or when any of the following contaminates are present:

Substance	OSHA Standard
Acrylonitrile	1910.1045(h), 1926.1145
Arsenic (inorganic)	1910.1018(h), 1915.1018, 1926.1118
Asbestos	1910.1001(g), 1915.1001(h), 1926.1101(h)
Benzene	1910.1028(g), 1915.1028, 1926.1128
1,3-Butadiene	1910.1051(h)
Cadmium	1910.1027(g), 1915.1027, 1926.1127(g), 1928.1027
Coke oven emissions	1910.1029(g), 1926.1129
Cotton dust	1910.1043(f)
1,2-Dibromo-3-chloropropane	1910.1044(h), 1915.1044, 1926.1144
Ethylene oxide	1910.1047(g), 1915.1047, 1926.1147
Formaldehyde	1910.1048(g), 1915.1048, 1926.1148
Lead	1910.1025(f), 1015.1025, 1926.62(f)
Methylene chloride	1910.1052(g), 1915.1052, 1926.1152
Methylenedianiline	1910.1050(h), 1915.1050, 1926.60(i)
Vinyl Chloride	1910.1017(g), 1915.1017, 1926.1117
13 Carcinogens (4-Nitrobiphenyl, alpha-Naphthylamine, Methyl chloromethyl ether, 3,3'-Dichlorobenzidine (and its salts), bis-Chloromethyl ether, beta-Naphthylamine, Benzidine, 4-Aminodiphenyl, Ethyleneimine, beta-Propiolactone, 2-Acetylaminofluorene, 4-Dimethylaminoazo-benezene, and N-Nitrosodimethylamine)	

General Industry standards are in Part 1910, Shipyard standards are in Part 1915, Construction standards are in Part 1926, and Agriculture standards are in Part 1928.

This plan established specific procedures for the use of air purifying respirators and supplied air respirators. Only supplied air respirators will be used when the oxygen level is less than 19.5%, the contaminant is unknown or in Immediately Dangerous to Life and Health Atmospheres (IDLH) and the wearer has been medically cleared and properly trained.

Air Monitoring

Air monitoring will be performed when it is established that respiratory protection is required to protect employees (*Exception: structural fire fighting*) from occupational exposures.

- **Air Purifying Respirators (APR)** are used the oxygen level (>19.5% but <23%) and Lower Explosive Limits (<10%) will be monitored continuously. If possible, the specific contaminant(s) suspected to be present will be monitored as frequently as necessary to ensure that the change out program is effective.

- **Supplied Air Respirators (SAR)** Oxygen level and the Lower Explosive Limits (<10%) LEL will be monitored continuously.

Assigned Protection Factor

The assigned protection factor (APF) of a respirator reflects the level of protection that a properly functioning respirator would be expected to provide to a population of properly fitted and trained users. For example, an APF of 10 for a respirator means that a user could expect to inhale no more than one tenth of the airborne contaminant present. The higher the APF the greater the protection to the wearer.

Table of APFs for various types of Respirators

Respirator Class and Type	OSHA	NIOSH
Air Purifying		
Filtering Facepiece	10	10
Half-Mask	10	10
Full-Facepiece	50	50
Supplied Air		
Full Face Pressure Demand	1000	2000
Self Contained Breathing Apparatus		
SCBA Pressure Demand	>1,000	10,000

Chapter 3

Program Requirements

The Respiratory Protection Standard, 29 CFR 1910.134 defines specific requirements that must be in place before employees can wear any form of respiratory protection. The most critical portions of this program are ensuring employees will be safe when wearing respiratory protection and are properly trained.

Assessment

Before an employee performs work that may require respiratory protection, the Department will request a hazard assessment of the **Respiratory Use Area** (RUA) by the Environmental Health and Safety Group. A hazard assessment will include:

- Identification of the contaminant(s)
- Measure of the concentration (if possible)
- Feasibility of product substitution
- Employee completion of the modified NIOSH based decision logic form

The Program Administrator will review the information and determine if respiratory protection is required. The Department will be notified of the decision of the Program Administrator. This information will be maintained by the EH&S Group and will be available for review upon request.

Respiratory Use Area

The Respiratory Use Area (RUA) is any location where respiratory protection is required to protect employees from known and unknown occupational exposures.

Modified NIOSH Decision Logic

Employees in the program will be required to *annually* review their Respiratory Use Area and complete the modified NIOSH decision logic form. The information contained in the Decision Logic will be used to re-assess the needs or identify changes in protection for each individual employee. Employees or work groups who are in the Program may be removed and/or added to this Program based on the assessment performed by EH&S Group and the completed Decision Logic form.

Exemption:

Sworn Fire Department Personnel are exempted from completing the Decision Logic. Sworn members of the Tempe Police Department are exempted from completion of the Decision Logic based on the use of respiratory equipment in emergency situations, such as the deployment of riot agents.

Medical Evaluation

Employees who are required to use respiratory protection must first undergo a medical evaluation **(Initial)** conducted by a licensed health care provider prior to wearing any respiratory protection. This medical evaluation is to determine whether the employee has any medical conditions that would place their health at an increased risk from the respirator use, including any recommended limitations when using a respirator. The licensed health care provider provides a written medical opinion to the Program Administrator on the results of the medical evaluation. All medical evaluations will be provided at no charge the employee. Each Department will be responsible for monetary costs of the medical evaluation. The Program Administrator will assist in the coordination of medical evaluations.

Frequency of Medical Evaluation

All employees that participate in the City's respiratory protection program are required to complete OSHA's Respirator Medical Evaluation Questionnaire every **two years**. The Medical Questionnaire will be reviewed by a licensed health care professional and additional medical testing may be required if in the opinion of the licensed health care professional it is necessary to ensure the health and safety of the employee.

Additionally, employees that use respiratory protection for hazardous materials response operations (asbestos abatement, chemical spills, clandestine drug labs, etc.) will undergo **annual** medical evaluations.

Note:

The City of Tempe's Fire Department participates in the City of Phoenix; Fire Department's Medical Evaluation Program and undergoes medical monitoring through that program.

Medical Records

Medical information generated by the respiratory protection program is kept strictly confidential between the employee and the medical facility. The City is only notified if an employee passes or fails the medical evaluation or if there are certain limitations on respirator usage by the employee.

Medical records as they relate to this program shall be retained, available and maintained by the Program Administrator in accordance with 29 CFR 1910.1020. These records are confidential and may only be viewed by the affected employee and the Program Administrator and/or their designee. The City of Tempe Fire Department maintains medical records as it pertains to their employees in regards to this program.

Temporary Employees

Temporary employees, interns, contractors or consultants are **prohibited from wearing any form of respiratory protection.** Temporary employees are not to perform tasks in any areas that require the use of respiratory protection.

Chapter 4

Fit Testing

Fit Test Requirements

The respirator fit test measures how effectively a particular model and size of respirator or disposable (Filter Facepiece) mask seals against the user's face. Since an air-purifying respirator can be used in a hazardous environment, the user's safety depends on an unimpaired seal of the respirator against the face. If there is a leak in or around the face piece, contaminants could enter and be inhaled. The results of the fit test determine whether the model and size of respirator mask worn during the test offer adequate respiratory protection. No employee will be fit tested until medical clearance is received by the Program Administrator.

The fit test is performed before the respirator is used in the workplace. It is repeated at least **annually** for all employees covered by this program. Fit testing must also be performed whenever a different respirator face piece is used or there is a change in the employee's physical condition which could affect respirator fit. If the respirator subsequently becomes unacceptable (i.e., causes irritation or pain to the employee), the employee will be given the opportunity to select a different type of respirator and be re-tested.

Note:

Disposable masks used for protection from a specific respiratory hazard and/or have any designation of filtering ability such as "N" or "P", have a double strap or exhalation valve must be fit tested in accordance with this plan, ***no exceptions****.*

Only individuals authorized by the Program Administrator shall perform fit testing on City employees covered by this program.

Type of Fit Test

The primary test method Tempe currently conducts is quantitative fit tests using the TSI Portacount®. A quantitative computerized fit test that compares the quantity of particles in ambient air with the level inside the respirator mask. Measurements are made in the breathing zone of the wearer. Qualitative fit testing may be substituted if approved by the Program Administrator. Individuals administering this type of test shall have received and successfully completed OSHA approved Respiratory Protection training.

Fit Factor

At the end of the quantitative fit test, the TSI Portacount® automatically calculates your **Fit Factor**, sometimes called the Protection Factor. The Fit Factor is a numerical measure of the degree of protection afforded you by the respirator. It is the concentration outside the respirator divided by the concentration inside the respirator. The minimum passing fit factor for all tight-fitting full-face respirators is **500** and **100** for half-face respirators.

The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where ff1, ff2, ff3, etc. are the fit factors for exercises 1, 2, 3, etc.

Fit Test Prohibitions

Employees may not undergo a fit test if;

- They have not met the medical requirements defined in Chapter 3 of the Program.
- They have hair between your skin and the sealing surface of the respirator mask. This includes facial hair such as a beard, beard stubble or long sideburns that cross the respirator seal area, **no exceptions**.
- They are wearing glasses, a hat or other clothing that interferes with the fit of the respirator. The employee will be asked to remove it.
- They have been diagnosed with a respiratory, mental, or physical problem that would make use of a respirator hazardous to your health and safety. Employees with questions regarding existing respiratory problems can contact Environmental Health and Safety Group.

Preparing for the Fit Test

Before the fit test begins, a description of the fit test procedures and employee responsibilities during the test procedure will be given. This short summary of the process will include a description of the test exercises to be performed. The respirator should be worn for at least five minutes or long enough to clear the mask of any particulates. In addition, the mask must be clean and in good operation condition.

Employees will be shown how to properly:

- Don a respirator
- Position the respirator on the face
- Adjust the strap tension
- Determine a comfortable fit
- Conduct a positive and negative user test
- Check the fit and proper position for the respirator.
- The respirator must provide both adequate protection and a comfortable fit.

The fit test checks the fit of the respirator under a wide variety of facial expressions in separate activities that simulate "normal" usage conditions. Employees may have to try more than one size or type of respirator mask to obtain a proper fit. After passing the fit test, employees will again be asked if the respirator is still comfortable to wear.

> Immediately notify the person administering the fit test if you have difficulty breathing during the respirator fit test or while wearing the respirator.

Elements of the Fit Test

As defined in Appendix A, 29 CFR 1910.134, *Fit Testing Procedures (Mandatory)*, the following elements of the computerized quantitative fit test will include:

All Tests shall be performed in a standing upright position

1. Normal breathing
2. Deep breathing
3. Turning head side to side
4. Moving head up and down
5. Talking
6. Grimace *(Excluded from Fit Factor)*
7. Bending over
8. Normal breathing.

Each test exercise shall be performed for 60-sconds, with the exception of the grimace, which will only be 15 seconds and is excluded from the fit factor calculation. The test subject will be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another size or model of respirator shall be tried.

The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

Additionally, when using a respirator for the first time, see if it still fits comfortably. If it does not provide a satisfactory fit during actual use, employees can request another quantitative respirator fit test that will be performed immediately.

Talking

During the talking test the employee shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Fit Test Records

The TSI Portacount provides a printed record of each fit test conducted. An electronic copy of the test receipt will be maintained by the Program Administrator until the next fit test (annual) is completed.

Chapter 5

Respirator Selection

The selection of the appropriate type of respiratory protection is based on the respiratory hazard or hazards to which the worker may be exposed and workplace and user factors that affect respirator performance and reliability.

For the purpose of this program when the exposure cannot be identified or reasonably estimated, the atmosphere is designated as Immediately Dangerous to Life and Health (IDLH) and an Atmosphere-Supplying Respirator is required (SCBA).

Air Purifying Respirators (APR)

Air-purifying respirators have a filter, consisting of a cartridge or canister that filters the existing ambient air before you breathe it. APRs require the force of your inhaled breath to draw air through the filter, and are called negative pressure respirators.

Negative pressure *devices rely on an airtight seal of the respirator against your face. If a leak exists in or around the facepiece, contaminants could enter and be inhaled.*

Powered Air Purifying Respirators (PAPR)

Powered air-purifying respirators use a pump or a fan to force air through the filtering element. This eliminates breathing resistance and **may** help maintain a positive-pressure in the facepiece.

Self Contained Breathing Apparatus (SCBA)

This is an atmosphere-supplying respirator for which the source of air is, taken into the atmosphere in an air tank, independent of any other source. SCBAs are normally used when there is a short period to enter and escape from atmospheres, which are or may be IDLH. This type a respirator is a **positive pressure** device.

Qualified Employee

For the purpose of this program, a **qualified employee** is an employee who has successfully completed a medical evaluation, fit test, initial respiratory program training, SCBA use/care training, demonstrated a competency in the proper use of an SCBA and been approved by the Program Administrator.

Airline Respirators

These respirators supply air to the respirator facepiece through a hose from a stationary source of clean, safe breathing air. They are normally used for extended work periods in atmospheres that are not IDLH and in areas that wearing a SCBA are difficult to enter. This device must be used with at least a 5-minute escape bottle attached to provide breathing air to escape from the contaminated atmosphere should the airline system fail. Use of this type of equipment requires additional training and must be approved by the Program Administrator.

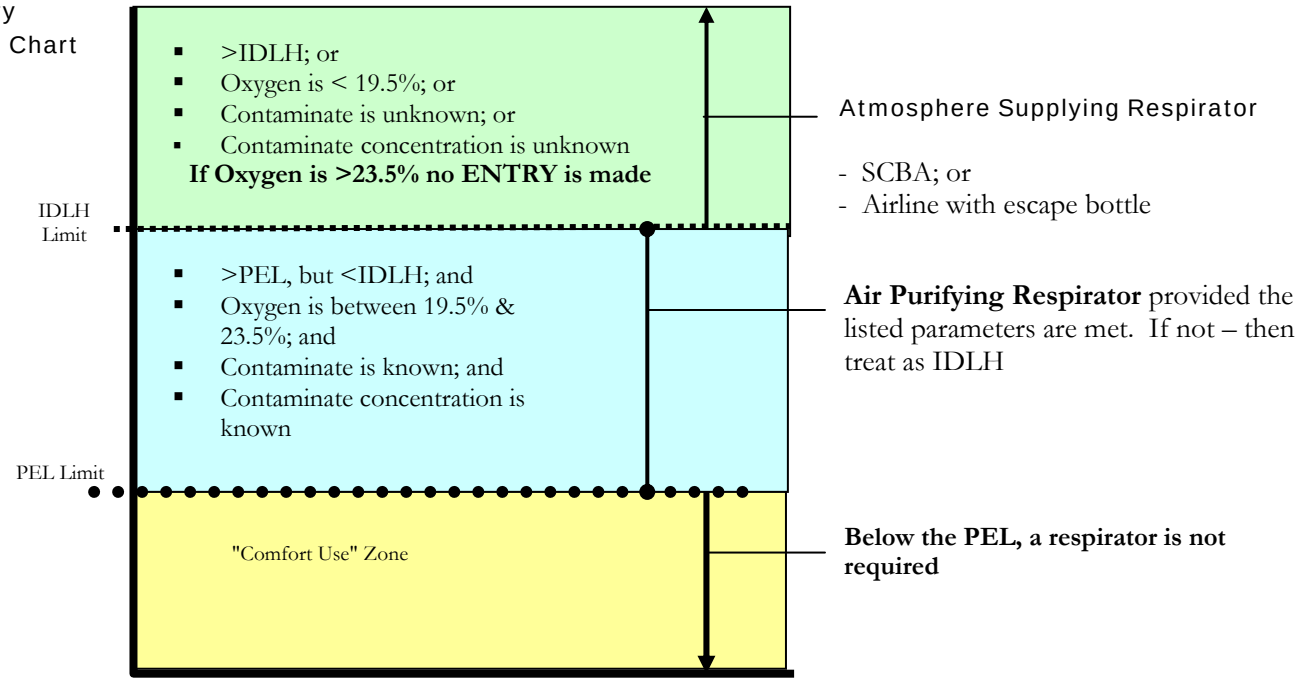
Emergency Escape Respirator (ESCBA)

Typically a 5 or 10 minute supply of air in a cylinder with detachable hood that encapsulates the user's head. ESCBA's will only be used when approved by the Program Administrator. Written procedures must be developed before employees are allowed to use ESCBA's. ESCBA's must be inspected before each use to ensure effectiveness. The Program Administrator must be notified before ESCBA are purchased and/or used.

Note: *The use of an ESCBA does not require the employee to be medically cleared or fit tested if the device is only used for escape from a hazardous atmosphere.*

The following chart illustrates the type of respiratory protection required under "normal" circumstances.

Respiratory Protection Chart



Factors That Influence Respirator Selection

The Physical Configuration of the Work Site

Tightly constrained areas may not permit the use of self-contained breathing apparatuses even though they might be an acceptable choice otherwise. Likewise, working around obstructions or moving machinery that can snag hoses may limit the use of airline respirators.

Worker Medical Condition

Wearing respiratory protection poses a physical burden on the wearer. When a worker's medical condition would prohibit restrictive breathing conditions, negative pressure respirators would not be an appropriate choice.

Worker Comfort

Worker preferences should be a consideration during the respirator selection process. Among air purifying respirators, powered air purifying helmets have been subjectively rated the best for breathing ease, skin comfort, and in-mask temperature and humidity while filtering facepieces rated high for lightness and convenience. Each, however, has its own drawbacks, and all these factors should be taken into account during selection.

Program Administrator Responsibilities

In order to properly identify the appropriate type of respirator protection, the Program Administrator must:

- Evaluate the work practice;
- Identify the hazards; and
- Monitor exposure levels to determine the maximum exposure levels;

The previous chart can then be used in determining the appropriate respiratory protection equipment.

Caution

Although proper selection and use of respiratory protection is an important factor in your safety, it is not the only factor. You must stay alert for a wide variety of other workplace hazards such as falls, fire, explosion and moving vehicles. Always remember to **continuously monitor work site conditions.**

Respirators for atmospheres that are not IDLH

Only respirators that are adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations are to be used. The respirator selected will be appropriate for the chemical state and physical form of the contaminant.

For protection against gases and vapors, the following respirators can be used:

- An atmosphere-supplying respirator, or
- An air-purifying respirator, provided that the respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant or there is a **Change Out Schedule** that will ensure that canisters and cartridges are changed before the end of their service life.

For protection against particulates, the following respirators can be used:

- An atmosphere-supplying respirator; or
- An air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84; or
- For contaminants consisting primarily of particles at least 2 microns in size, an air-purifying respirator equipped with any NIOSH-certified filter for particulates.

Respirators for IDLH Atmospheres

The following respirators are required for employee use in IDLH atmospheres:

- A full facepiece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or
- A combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary escape self-contained air supply.
- Respirators used only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

Requirements for IDLH Atmospheres

When respirators are used for IDLH atmospheres a rescue sector consisting of at least two employees located outside the IDLH atmosphere, which are trained and equipped to provide effective emergency rescue. At all times visual, voice or signal line communication will be maintained by the employees inside the IDLH atmosphere and with the employees located outside.

The Program Administrator and/or the EH&S Group must be notified before IDLH atmosphere's atmospheres are entered by City of Tempe employees or contractors (exception TFD).

Note: It is highly recommended when an IDLH atmosphere is entered that the TFD be notified. In addition, if the RUA is a confined space special hazards may be encountered and all employees must be trained in accordance with Chapter 10 of this Program.

Use of Filtering Face Piece, Disposable Mask (Dust Mask)

Any employee wearing a filtering face piece dust mask for comfort/voluntary use ***must*** notify the Program Administrator prior to use. Wearing certain forms of respiratory protection can place additional stress on the body and may result in an injury.

Any employee wearing a filtering face piece that meets any of the following criteria must also obtain medical clearance prior to use, even if used as a comfort/voluntary use:

- Has any designation such as "P" or "N".
- Has a double strap.
- Has an exaltation valve

In addition, please refer to Fit Test requirements specified in Chapter 4.

Prohibitions When Using Respirators

OSHA prohibits the wearing of respirators when conditions prevent a good face seal. These conditions include:

- Facial hair (beards, sideburns, certain mustache styles) which interferes with the facepiece-to-face seal. Even a few days' growth of facial hair will allow excessive contaminant to enter the facepiece.
- Eye glass temple pieces that interfere with the seal between the respirator and your face. See "Spectacle Kits" in next section
- The absence of one or both dentures can seriously effect the fit of a facepiece.
- The wearing of contact lens with quarter- or half-face respirators, without supplementary eye protection, such as chemical splash goggles is prohibited. Extreme caution should be used when wearing contact lenses in full-face respirators. The use of a spec-kit, instead of contact lenses is strongly recommended.
- Chewing gum or tobacco while using a respirator is prohibited, as this too may compromise the seal of the respirator against your face.
- Modifying a respirator in any manner is strictly prohibited and will invalidate its use as an approved respirator.

  Removing the respirator in a hazardous environment.

Spectacle Kits

Spectacle kits are to be used when an employee needs prescription corrective lenses. The kit will be purchased by the individual Department at no cost to the employee. A voucher for the corrective lenses can be obtained from the Risk Management Department.

Chapter 6

Air Purifying Respirator (APR)

Air-purifying respirators (APRs) selectively reduce **specific** airborne contaminants from the air by filtration, absorption or chemical reaction. As you inhale, air is drawn in and purified as it passes through a disposable filter, also called a cartridge. The filters are designed to trap particulates or gases and vapors. Most workers use "combination" cartridges that protect against both particulate matter and gases or vapors.

Under OSHA's Respiratory Protection Standard (§1910.134), the City is responsible for ensuring that you have the proper training, equipment and fit test for your respiratory protection. For this reason, employees are only to use respirators approved by the Program Administrator.

Approved Manufactures

All respiratory protection used to protect an employee from a specific atmospheric hazard will be NIOSH approved. At the present time the City of Tempe has employees who are certified to repair Mine Safety Appliances® (MSA) respiratory equipment. Therefore, the City will use MSA as its primary respiratory equipment. If an employee can not be fitted into a MSA respirator another suitable brand will be selected by the Program Administrator.

Purchase of APR's

APR's will not be purchased until the Program Administrator has performed an assessment of the respirator use area (RUA) and determined respiratory protection is necessary. In addition, employees must be medically cleared and fit tested before the APR is ordered. The Program Administrator will notify the Department of the type and size of respirator to purchase.

- Full-facepiece mask

  This type covers the respirator user's entire face from the hairline down to the chin. This type of mask provides excellent eye protection in addition to respiratory protection. The City strongly recommends is requiring the use of full-facepiece respirators for all atmospheric hazards, unless the use increases the overall hazard to the employee.

- Half masks

  This type covers from the nose down to the chin of the respirator user. This type of facepiece mask **does not** provide any form of eye protection. Additional personal protective equipment would be required when there is an eye hazard present in addition to the respiratory hazard. The protection provided by a full face respirator includes eye and face protection. Use of this type of mask must be approved by the Program Administrator.

When Can APR's Be Used

- Contaminants have been identified and measured;
- Contaminant concentration is not immediately dangerous to life and health (IDLH);
- Oxygen concentration is above 19.5% and below 23.5%;
- Cartridges are available that will protect against the identified contaminants at the level at which they occur; or
- The cartridge has an End of Service Life Indicator (ESLI) or there is a change out scheduled developed for the specific use of that canister.

Cartridges

An air-purifying cartridge, also referred to as a canister, is a container with a filter, adsorbent, or catalyst, or combination of these items, which removes specific contaminants from the air, as it passes through the container.

When is a Cartridge in Use

As soon as the sealed packaging of the cartridge is opened, the cartridge is considered in use. No cartridge will be used for longer than ***eight (8) hours***. Open cartridges may be used for training, provided they have not exceeded a change out schedule and have been approved for use by the Program Administrator. Cartridges used for training purposes must clearly identify as such.

P-100 filters used only for particulate filtration are not typically in sealed packages. Therefore, these types of cartridges are not considered to be in use until placed on a respirator. Once this occurs, the cartridge may only be used for eight working hours.

Factors That Can Reduce Cartridge Service Life

Worker Exertion Level

The service life of a cartridge is dependant upon the total amount of contaminant captured by the adsorbent and is directly related to the work rate or breathing rate. Increasing the breathing rate results in a decrease in the service life.

Respirator Cartridge Variability

The service life of a respirator cartridge is directly related to the amount of active material in the cartridge. These can vary from manufacturer to manufacturer.

Temperature

High temperatures can adversely affect the adsorptive capacity of respirator cartridges and canisters. Temperature effects alone have been reported to reduce the service life 1-10% for every 10 degrees Celsius rise depending on the specific solvent (Nelson, et. al., 1976).

Relative Humidity

High relative humidity is a significant negative factor in the capacity of organic vapor cartridges since the large quantity of water vapor will compete with the organic vapors for active sites on the adsorbent.

Multiple Contaminants

Multiple contaminants introduce a great deal of variability into the prediction of service life for respirator cartridges

Choosing Proper Cartridge

Use only the respirator cartridges for those substances for which they have been specifically approved. Each filter cartridge package lists the chemicals against which it is designed to protect. Once the contaminants are identified and measured, simply check your supply of cartridges to determine if the cartridge type you need is available. If not, contact the Program Administrator to determine if a cartridge exists that will meet your needs.

Cartridges are designed to protect against a ***specific*** contaminant or ***class*** of contaminants. One cartridge ***does not*** protect against all contaminants. The use of a cartridge for protection against a contaminant for which the cartridge is not approved is prohibited. Using the wrong cartridge can result in an increased exposure to the user since the employee tends to work at an increased exertion level believing they are adequately protected when they are not. This can have severe adverse consequences to the wearer's health. If you are unsure you are using the proper cartridge, ask the Program Administrator for clarification.

Color Code for Cartridges

Atmospheric Contaminant or Assigned	Color
Acid Gases Only	White
Organic Vapors Only	Black
Ammonia Gas	Green
Acid Gases and Organic Vapors	Yellow
Radioactive Materials (except tritium and noble gases)	Purple
Dusts, Fumes and Mists (other than radioactive materials)	Orange
Other Gases and Vapors (not listed above)	Olive Green

References: The information for this chart is taken from ANSI K13.1-1973, Identification of Air-Purifying Respirator Canisters and Cartridges.
Notes:

1. A purple strip shall be used to identify materials in combination with any vapor or gas.
2. An orange strip shall be used to identify dusts, fumes and mists in combination with any vapor or gas.
3. Where labels only are colored to conform to this table, the canister or cartridge body shall be gray or metal canister may be left in its natural metallic color.
4. The user shall refer to the wording of the label to determine the type and degree of protection the canister or cartridge will afford.

Concentration Limits

Filter cartridges will absorb contaminants for only a limited amount of time. The higher the concentrations of contaminants present in the atmosphere, the faster the filter is depleted. A Maximum Use Concentration (MUC) level is listed on each cartridge package. Do not use a cartridge where the level of contaminant exceeds this concentration. Employees are required to review the established canister change-out schedule before they enter the respirator use site.

When to Change Cartridges

Canisters must be equipped with an **End-of-Service Life indicator** (EHSL) or the user must develop a written change out schedule for each specific contaminant. The purpose of a change out schedule is to establish the time period for replacing respirator cartridges and canisters; this is critical in preventing contaminants from respirator breakthrough, and thereby over-exposing workers. Because so many variables can affect a canister's effectiveness, the change out schedule is a guideline to protect a user from air-borne contaminants. All filter cartridges and chemical canisters are to be replaced when they reach their designated end-of-service life time frame or at the end of the work shift, whichever is sooner.

Change Out Schedule

The City is required to use cartridges with an ESLI to ensure employees are protected from contaminants. As defined in 29 CFR 1910.134(d)(3)(iii)(B)(2) if there is no ESLI appropriate for conditions in the employer's workplace, the employer must implement a change out schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. The City must describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.

Based on this the City of Tempe is utilizing the objective data from MSA, the manufacturer of the cartridges used by Tempe, to help establish the change schedule. This information, along with air monitoring survey results, will enable the City to use OSHA's "Advisor Genius" to determine contaminant breakthrough times needed to calculate change schedules.

Note:

Public Safety employee's who don an APR for protection against a respiratory hazard that is a suspected Chemical, Biological, Radiological; Nuclear (CBRN) agent will follow established procedures and protocols for use. The employees safety is of utmost importance and a change out schedule will be established as soon as feasible and at the discretion of the Incident Command System who will use all available resources in the establishment of the schedule.

Some important items to keep in mind when developing a Change-Out- Schedule are:

- You may not rely on odor thresholds and other warning properties as the primary basis for determining the service life of gas and vapor cartridges/canisters.
- You should account for environmental and user factors and use a conservative approach when evaluating service life testing data.
- Should apply a "safety factor" (obtained from manufacturer) to any estimate to account for uncertainty.
- Mixtures, intermittent use and concentrations, storage practices and other variables may require the use of an administrative time limit, e.g. one day, even though the estimated life would be longer.

EH&S Group can assist you in accessing the information necessary to develop your change out schedule. A change out schedule must be established **before** employees begin working in the environment that requires respiratory protection.

Here are some additional warning signs that can help you determine when a canister is beginning to lose its effectiveness and should be replaced:

- When inhaling through the filter becomes more difficult, particles are beginning to clog the filter. Particulate filters actually become more efficient as they fill up, so the main danger is of increasing your exertion with every breath.

- When you begin to detect an odor, taste, or an irritation develops while using a gas/vapor removing filter cartridge this is a danger sign. The filter has become overwhelmed and can no longer absorb the contaminant; the full concentration of the chemical is allowed to enter the facepiece. **IMMEDIATELY LEAVE THE AREA**.

Change Out Schedule – Record Keeping

Change Out Schedules will be maintained by the Department for a period of one-year and be available upon request by the Program Administrator. If an exposure occurs during respirator use, the Change Out Schedule will be forwarded immediately to the Program Administrator. A medical examination may be required based on the exposure.

Odors – Irritation in an APR

Odor and irritation are unreliable or inappropriate to use as indicators of sorbent exhaustion. Where an effective change schedule is implemented, air-purifying gas and vapor respirators may be used for hazardous chemicals, including those with few or no warning properties.

The City requires that all respirator users be trained to understand that abnormal odor or irritation is evidence that respirator cartridges needs replacing and to immediately leave the respirator-use area.

Cartridge Disposal

Spent cartridges and canisters are not a hazardous waste (per ADEQ guidance) and do not necessitate any special disposal requirements. They can be disposed of directly into the trash. Cartridges used in hazardous materials incident response operations, especially mercury spills, are to be disposed of with the contaminated debris by the City's hazardous waste contractor.

Warning

Never reuse or try to clean a respirator cartridge or canister. Immediately discard your old and spent cartridges/canisters to prevent their accidental reuse. Failure to do so can result in the accidental exposure to the respirator user.

> ***Warning***
>
> If you experience irritation, shortness of breath, watery eyes the cartridge you are using may have had a breakthrough or your seal is compromised. Stay alert for warning signs and if you experience any, leave the area immediately. For your protection, dispose of a cartridge on-site once it has been used for respiratory protection, or when it is removed from the respirator. Do not store respirators with cartridges connected.

Proper APR Use

Donning

Properly donning the respirator is a key factor in obtaining a proper fit. The following procedures are intended to provide general guidance to the respirator wearer and can vary depending on the make and model of respirator worn.

- Fully loosen all of the head straps so that the ends are at the buckles.
- Grip the facepiece between the thumb and fingers and insert the chin well into the lower part of the facepiece and pull the headbands back over the head.
- To obtain a firm and comfortable fit against the face at all points, adjust the headbands as follows:

    1. Make sure the straps lie flat against the head.
    2. Tighten the "LOWER" or neck straps.
    3. Tighten the "SIDE" straps (If present, DO NOT touch the "FRONT" or forehead strap.).
    4. Place both hands on the headband pad and push down towards the neck.
    5. Repeat steps (2) & (3).
    6. Tighten the forehead or "FRONT" strap a few notches ***if necessary***.

Be careful not to over tighten the straps as evidenced by deep crease marks on the face when the respirator is removed. This can cause discomfort to the wearer and potential exposure if attempts to readjust the respirator in the respirator use are made.

User Seal Check

Once you have donned the respirator, it is important to determine if there is a proper facepiece-to-face fit. This is achieved by conducting positive and negative pressure user seal check tests. User seal checks are not substitutes for qualitative or quantitative fit tests. Do this each and every time you put on a respirator and BEFORE entering an area with hazardous atmospheres or performing work that can generate hazardous gases, fumes, dusts or mists. The following process must be performed each time you don your respirator.

Positive Pressure Check

Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

Negative Pressure Check

Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s). Inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

WARNING

Failure to properly perform the User Seal check **BEFORE** entering the respirator use area can result in an improper fit of the respirator and an exposure to the respirator user.

Disposable Mask

Non- Hazardous

The use of disposable masks to protect employees from nuisance odors or particulates, such as dust (below the PEL or STEL), is considered **comfort-use (Voluntary)**. Employees, who wear disposable masks for comfort-use only, are **exempt** from the medical evaluation requirements under this Respiratory Protection Program. Provided the mask does not meet the description below:

- Has any designation such as "P" or "N".
- Has a double strap.
- Has an exaltation valve

Employees are required to participate in the Respiratory Protection Program's employee training class as defined in *§1910.134, Appendix D (Mandatory), Information For Employees Using Respirators When Not Required Under The Standard.* This is to ensure that all employees are able to properly identify respiratory hazards and when the use of a disposable mask may be insufficient to provide adequate respiratory protection.

The Program Administrator must be notified of any employees or work groups who use disposable mask for comfort use (Voluntary).

Disposable Mask

(Single and Double Strap)

When a disposable mask (Filtering face piece; such as N-95) is used to provide respiratory protection, then the medical evaluation, fit testing and training requirements are applicable. An assessment of the respirator use area must be performed by the Program Administrator.

Respiratory Protection for Tuberculosis Exposure

If employees in the course of their job duties may have the possibility to have an occupational exposure to *Tuberculosis (TB*), the Program Administrator and Risk Management must be notified. Employees who meet the criteria will be required to meet all the requirements specified in this program.

WARNING

Disposable masks are to be used only for a single shift (for continuous or intermittent use). **UNDER NO CIRCUMSTANCES WILL A DISPOSABLE MASK BE USED IN IDLH CONCENTRATIONS.**

Voluntary Use

The City of Tempe is **prohibiting** the use of employee purchased APR's for comfort use. Should an employee feel the need to wear a respiratory for comfort use the employee will use disposable filtering facepiece, single strap. It is up to the individual Department/Divisions as to whether they will purchase comfort use masks for employees.

Any City of Tempe employee who voluntarily uses respiratory protection must receive training as defined in this plan to ensure that the employee fully understands potential hazards. No employee shall wear any form of respiratory protection until the Program Administrator has been notified of the employee's intent to wear a respirator under the voluntary use program. The Program Administrator will perform an Assessment as defined in Chapter 3. Training will be required annually.

Individual Departments/Divisions are required to notify the Program Administrator of any employees who use respiratory equipment on a voluntary basis.

Chapter 7

Atmosphere-Supplying Respirators

An atmosphere-supplying respirator is a respirator in which breathable air is taken into the atmosphere in an air tank, independent of any other source. There are two forms of air-supplying respirators, Self Contained Breathing Apparatus (SCBA) and air lines. Both types are considered positive pressure respirators and provide the user the highest level of respiratory protection.

The use of either of these devices requires specialized training and clearance from the Program Administrator prior to use *(Exception Sworn Fire and Police Department Personnel)*

Authorized SCBA Users

The following work groups are authorized to wear SCBA's:

- Sworn Tempe Fire Department Personnel
- Tempe Police Department – Narcotics Officers and SWAT
- EH&S Group
- Environmental Services Division
- Individuals as approved by the Program Administrator

When is an SCBA Required

- When the atmosphere is immediately dangerous to life and health (IDLH) or is likely to become so; or
- Dealing with unidentified and unquantified airborne contaminants; or
- When working in confined or poorly ventilated areas and the oxygen level is below 19.5%

Breathing Air Quality

The City will ensure that only breathing gases of high purity will be used with atmosphere-supplying respirators (supplied-air and SCBA). Compressed breathing air will meet the requirements for Type 1-Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.

Authorized users (except TFD-TPD) in this program must contact the EH&S Group for re-filling bottles.

WARNING

The air cylinder pressure must be maintained at 90% of the manufactures recommended pressure level when in storage for use. **NEVER** drain a bottle completely.

Proper SCBA Use

Wearing a SCBA places the employee at a higher level of exposure should a failure in respiratory protection occur. The following are requirements that will be followed each time an employee dons a SCBA for purpose of respiratory protection:

1. Employees are required to work in pairs, no exceptions.
2. A Backup Team is required when using an SCBA in an IDLH atmosphere or unknown atmosphere.
3. An air management system will be instituted as described during initial SCBA training.
4. Immediately exit the respirator use area if the unit fails to function or alarms.
5. Monitor LEL continuously. SCBA use is prohibited in atmospheres with >10% LEL *(Exception Sworn Fire Department Personnel)*
6. Use appropriate personal protective equipment as determined by a hazard assessment.

SCBA Monthly Use

Employees who wear SCBA's are required to be able to demonstrate proficiency with all aspects of the equipment. It is highly recommended that employees in these work groups don the wear the equipment and be on air at least once per month.

Air Line Use

Employees who use air line equipment are required to obtain additional training that is approved by the Program Administrator. This training must ensure that employees are proficient with the specific equipment and hazards associated with using the equipment. Employees using Air Line equipment will be highly encouraged to use the equipment in a manner that increases their overall efficiency with equipment in environments they are expected to operate within. Training must receive the approval of the Program Administrator.

Chapter 8

INSPECTION OF RESPIRATORS

Monthly Inspection

The proper functioning of respirators and ensuring that the devices themselves do not pose a hazard to the user require a regular maintenance and cleaning schedule. In general, respirators should be inspected for basic function prior to each use and cleaned as often as necessary to prevent the occurrence of unsanitary conditions.

For the purpose of the plan, respirators (Face Piece) are to be inspected monthly, and checked for proper function before and after each use and during cleaning. SCBA's will be inspected monthly and before and after each use.

Inspection Records

A written inspection record is required for the inspection of all respirators and SCBA's. This is to include the date of the inspection, the name (or signature) of the person making the inspection, and a serial number or other means of identifying the inspected respirator. In lieu of written records, electronic means of recording the information is permissible provided the information is specific to the employee and is able to be produced (printed) upon request.

APR Inspection Procedure

The following procedures will be used for inspection of APR's:

- Check the facepiece for dirt, cracks, tears or holes. Inspect the shape for possible distortions that can occur from improper storage. The face seal should be soft and pliable, with no cracks or tears.
- Check both cartridge holders to make sure that the gaskets are present and intact. They are often the same color as the holder itself, so they are easy to miss. Check for any cracks or damage to the threads. Replace the gaskets with the beveled side inward toward the facepiece.
- Open the exhalation valve cover, located under the chin on the respirator. Check for cracks, tears or anything that inhibits the seal. Replace the cover by snapping it into place.
- Check inhalation valve for cracks, tears, distortion, sand, or dirt. Be sure to look in the center indentation over the respirator valve itself. If you see dirt or other buildup of material over the valve, gently remove it using respirator wipe.

- Check the head harness for cracks or tears. Stretch the elastic bands to ensure that they still have their elasticity and that all of the ridges are present. Make sure that all buckles are in place and working properly.
- Make sure that your cartridges or filters are uncontaminated and capable of protecting you properly; they must be tightly sealed in their original plastic wrappers. Inspect the cartridges for dents, scratches or other damage, particularly the metal sealing bead around the bottom.
- Don the respirator and conduct the positive and negative pressure tests.

> ***WARNING***
>
> Failure to properly inspect a respirator **BEFORE** donning it and entering the respirator use area can result in an improper fit or function of the respirator and an exposure to the respirator user.

SCBA Inspection Procedure

The following procedures will be used for inspection of SCBA's

- Check that the cylinder gauge needle is on FULL.
- Check that the cylinder valve is OPEN.
- Check that the cylinder is securely in place.
- Check that the all straps are fully extended and show no signs of deterioration.
- Check that the buckles work properly.
- Check that the coupling nut at the cylinder valve is tight.
- Check that the alarm bell is clean, unobstructed and positioned in a manner as not to collect water or other contamination.
- Check that the high-pressure hose fittings at the Audi-Alarm bell are tight.
- Check that the high-pressure hose is not damaged. Inspect the tube for perforations, small cracks, and signs of wear, especially along the corrugations.
- Check that the mainline and emergency bypass valves are closed (do not open the mainline valve until you have your facepiece on and are ready to attach the high pressure hose).
- Check the regulation pressure gauge. It should read the same as the cylinder pressure gauge. If not, do not use the SCBA. The regulator may be malfunctioning and need repair.
- Once the facepiece is on, check the operation of the emergency bypass valve. Do not use if the valve is malfunctioning.

SCBA's also require an inspection of the air and oxygen cylinders to assure that the cylinder pressure is maintained at 90% of the manufacturer's recommended pressure level (for example 90% of 3000 p.s.i. tank maximum would be 2700 p.s.i.) and that the regulator and low pressure warning devices function properly. To assure that both the regulator and low pressure warning devices function properly the warning device must be activated and heard by the person performing the inspection.

Failure of any Part of the Inspection

If you find any deficiencies during your respirator inspection, **DO NOT USE THE RESPIRATOR.** Contact the Program Administrator for instructions and/or replacement parts.

Any respirator that fails an inspection or is otherwise found to be defective will be immediately removed from service and either discarded or repaired. Use of respiratory equipment that fails an inspection is violation of this procedure and places the user at risk of serious injury or death.

The user is responsible for notifying their Supervisor if a respiratory fails inspection. The Supervisor is responsible for notifying the EH&S Group who will have the equipment repaired. A replacement will be provided by EH&S Group if it is feasible to do so

Respiratory Equipment Maintenance and Repair

Repairs and/or adjustments to respiratory equipment or respirator face pieces are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the specific equipment. Reducing and admission valves, regulators and alarms shall be adjusted or repaired only by the manufacture or a technician trained by the manufacture.

Departments will maintain records of all maintenance performed and provide notification to the EH&S Group when repairs or routine manufacture checks are required (Flow Testing, Hydro-static Testing).

The modification of any respiratory equipment is prohibited

Chapter 9

CLEANING AND STORAGE

Cleaning Schedule

Respirators are to be cleaned and disinfected at the following intervals:

1. Respirators issued for the exclusive use of an employee will be cleaned and disinfected by the employee as often as necessary to be maintained in a sanitary condition;

2. Respirators issued to more than one employee will be cleaned and disinfected before being worn by different individuals. The use of individually-wrapped cleaning towelettes may be used as an interim method in the cleaning schedule for individually assigned respirators, but they must not be the only method in place;

3. Respirators maintained for emergency use will be cleaned and disinfected after each use; and

4. Respirators used in fit testing and training will be cleaned and disinfected after each use. A wipe can be used in between fit tests. During fit testing, towelettes may also be used between employees being tested; however these respirators must be thoroughly cleaned at the end of each day, using the procedures outlined below.

Procedures for Cleaning Disinfecting

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacture of the respirators used by their employees, provided such procedures are as effective as those listed below. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth below, must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

Note:

NEVER USE alcohol to clean any part of a respirator unless directed to do so by the Program Administrator, DPA or member of EH&S Group.

- Remove filters, cartridges or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

- Wash components in warm (43° C -110° F maximum) water with mild detergent or a cleaner recommended by the manufacture. A stiff bristle (not wire) may be used to facilitate the removal of dirt.

- Rinse components thoroughly in clean, warm (43° C -110° F maximum), preferably running water. Drain.

- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

    1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at (43° C -110° F maximum); or,

    2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodine/100cc of 45% alcohol) to one liter of water at (43° C -110° F maximum); or,

    3. Other commercially available cleaners of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

- Rinse components thoroughly in clean, warm (43° C -110° F maximum), preferably running water. Drain. The importance of through rinsing cannot be overemphasized. Detergents of disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

- Components should be hand dried with a clean lint-free cloth or air-dried.

- Reassemble facepiece, replacing filters, cartridges, and canisters where necessary

- Test the respirator to ensure that all components work properly.

Storage

Respirators must be properly stored to protect them against physical damage, contamination, excessive moisture, extreme temperatures, sunlight, and damaging chemicals. Emergency use respirators must be stored in compartments OR in covers, both of which must be clearly marked or easily identified as containing the emergency respirators. Respirator bags that are used for a specific purpose, such as those used by TPD and TFD will be considered appropriate storage and do not have to be marked.

WARNING

The excessive heat in Arizona can have an adverse effect on the respirator facepiece. It is imperative that respirators are kept out of direct sunlight and not stored in excessive heat. Improper storage of the respirator can compromise the integrity of the respirator and inhibit the proper function of the respirator in routine and emergency use.

Chapter
10

TRAINING

The City is required to provide training to all employees who wear respiratory protective equipment. Training will be performed annually, **no exceptions**.

The Program Administrator will authorize all training, with the exception of Sworn Fire Department Personnel. This is based on the stringent training and written procedures in place. All approved training shall be documented and must include the employee's name, signature or initials of the trainers, and the dates of the training. This documentation must be available for inspection by employees or their authorized representatives. Employees will be provided the opportunity to ask any questions about respiratory protection during training.

APR – Training Requirements

The Program Administrator **must** be notified by the Department of any employees who will be wearing an APR. Training will ensure employee proficiency in:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- What the limitations and capabilities of the respirator are;
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
- How to inspect, put on and remove, use, and check the seals of the respirator;
- What the procedures are for maintenance and storage of the respirator;
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
- The general requirements of OSHA's Respiratory Protection Standard.

During the annual fit test, employees will be provided with the required refresher training in the proper fit and donning of their respirator. This refresher will be competency based. The employee will be expected to describe the use, limitations, successfully don, take the respirator apart/reassemble and identify correct inspection procedures.

SCBA for Hazardous Material Operations - Training Requirements

Employees who will be expected to engage in Hazardous Material Operations, must first successfully complete all appropriate training as defined in §1910.120, *Hazardous Waste Operations and Emergency Response.* Individual Departments will determine if their employees will be expected to work in this type of environment. The Program Administrator **must** be notified by the Department of any employees meeting this requirement.

Additionally, employees must receive specific training on the use of self-contained breathing apparatus, with annual re-certification checks. SCBA training will include the following training objectives:

- Identify at least four hazardous respiratory environments
- Demonstrate the use of SCBAs used by your Department.
- Identify the physical requirements of the wearer, the limitations and safety features of a SCBA
- Demonstrate donning SCBAs while wearing protective clothing
- Demonstrate that the SCBA is in a safe condition for immediate use
- Identify the procedure for cleaning and sanitizing the SCBA for future use
- Identify the procedures for inspection and maintenance of breathing apparatus
- Demonstrate the following emergency techniques using SCBA to:
  - Assist others
  - Conserve air
  - Overcome restricted use of by-pass valves

Employees using respiratory equipment for hazardous material operations are required to train regularly with the equipment they will be expected to use during these incidents. It is important to note that 29 CFR 1910.120 has specific requirements for employers who have employees working at these incidents including operating under a written health and safety plan. Employees working under an Incident Command System (ICS) established by the Tempe Fire Department (or like Agency) may operate without a written plan. This is based on emergency operations plans that are already in place during these types of incidents. The following work groups are currently authorized to participate in hazardous materials incidents:

- Sworn Tempe Fire Department Personnel
- Tempe Police Department – Narcotics Officers and SWAT
- EH&S Group

If a Department or an employee is expected to operate at hazardous material incidents, they must notify the Program Administrator in writing. This is to ensure employees are properly trained and in compliance with 29 CFR 1910.120.

SCBA – Training Requirements

The Program Administrator **must** be notified by the Department of any employees who will be wearing a SCBA. Employees must receive specific training on the use of self-contained breathing apparatus, with annual re-certification checks. SCBA training will include the following training objectives:

- Identify at least four hazardous respiratory environments
- Demonstrate the use of SCBAs used by your Department.
- Identify the physical requirements of the wearer, the limitations and safety features of a SCBA
- Demonstrate donning SCBAs while wearing protective clothing
- Demonstrate that the SCBA is in a safe condition for immediate use
- Identify the procedure for cleaning and sanitizing the SCBA for future use
- Identify the procedures for inspection and maintenance of breathing apparatus
- Demonstrate the following emergency techniques using SCBA to:
  - Assist others
  - Conserve air
  - Overcome restricted use of by-pass valves

Air Line - Training Requirements

The Program Administrator must be notified by the Department of any employees who will use air line equipment. Employees must receive specific training on the use of this type of equipment, with annual re-certification checks. Training will include the following training objectives:

- Identify at least four hazardous respiratory environments
- Demonstrate the use of the air line used by your Department.
- Identify the physical requirements of the wearer, the limitations and safety features of an air line.
- Demonstrate donning air line face piece while wearing protective clothing.
- Identify the procedure for cleaning and sanitizing the SCBA for future use.
- Identify the procedures for inspection and maintenance of breathing apparatus.
- Demonstrate the use of the escape bottle.
- Demonstrate the following emergency techniques using air lien to:
  - Assist others
  - Conserve air
  - Overcome restricted use of by-pass valves

Respiratory Equipment for Confined Space Operations

Departments or employees that are expected to wear respiratory protection equipment during confined space operations must receive specialized training that meets the requirements of 29 CFR 1910.146 and 1910.134. Based on the nature of confined space operations the use of Air Purifying Respirators (APR) is **prohibited** unless approved by the Program Administrator.

If the space is IDLH (including Oxygen Deficiency) all requirements specified in Chapter 5, Requirements for IDLH Atmospheres must be met. The configuration of most confined spaces makes it difficult to enter with a SCBA. Therefore, it is highly recommended that an air line system be used.

Escape – Self Contained Breathing Apparatus (ESCBA)

Departments or employees that will use ESCBA must notify the Program Administrator. Training will be in accordance with the manufactures requirements. The Department will be responsible for developing written procedures in the proper use and maintenance of ESCBA equipment. This procedure will be available to all employees upon request.

Chapter 11

SIGNS & SYMPTOMS OF EXPOSURE

Wearing any form of respiratory equipment places additional stress both physically and mentally on individuals. It is important for users of respiratory equipment to be able to recognize hazards, including the mode, signs or symptoms, and consequences of exposure.

If the employee has properly identified all of the actual or potential hazards that will be present in the respirator use area and if a MSDS for that substance is required to be at the workplace by the Hazard Communication Standard (§1910.1200), information concerning that substance, including its mode of action, will be readily available for individuals wearing respiratory protection.

It is the intent of this program to provide the highest level of protection to individuals wearing respiratory equipment. Remember, if you can not identify the contaminant or the concentration, air supplying respirators must be used. All respirator users must know the symptoms of oxygen deficiency as defined below:

Oxygen Deficiency

Is caused by displacement by other gases, bacterial decay, chemical reactions that use oxygen such as rusting, absorption, combustion, burning and welding.

Oxygen Level	**Symptoms**
15 – 19%	Loss of muscular coordination could impede self rescue.
12 – 14%	Rapid breathing and pulse. Impaired judgment/coordination.
10 – 12%	Further increase of respiration/pulse.
8 – 10%	Fainting, nausea, vomiting, blue lips.
6 – 8%	4 -5 minutes of exposure = recovery with treatment 6 minutes = 50% 8 minutes = 100% fatal
0 – 6%	Coma in 45 seconds or less. Death

Heat Disorders and Health Effects

Working outside during the summer months exposes workers to serious health hazards that can cause permanent damage or death. Extreme caution must be exercised by entry team members who have to enter a confined space. Scheduling entries in the early morning should be the considered for every entry. Employees should be allowed to acclimate to the heat. If an employee is on vacation or off for even a few days, they should be given several days to acclimate themselves before working in the heat.

Departments should ensure that employees receive training each year that informs affected employees on the hazards of working in hot environments. The following are stages of heat disorders, in increasing severity.

Heat Rash

Heat rashes are common in the work environment. "Prickly" heat appears as red papules, usually in areas where the clothing is restrictive. Occurs when skin that is persistently wetted by unevaporated sweat. Heat rash papules may become infected if not treated. In most cases the rash will disappear when the affected individual returns to a cool environment.

Heat Cramps

Heat cramps commonly result from performing hard physical work in a hot environment. These cramps are attributed to the continued loss of salt that occurs during sweating. Cramps can be elevated by resting and drinking water. Salt tablets **should not be used**. Drinking lots of fluids the day before the activity will decrease the potential for heat cramps. Frequent rest breaks and fluid is high encouraged during hot times of the year. Sports drinks may be taken but should not replace water entirely.

Heat Exhaustion

The symptoms are headache, nausea, vertigo, weakness, thirst, and giddiness. Responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly. Fainting can be associated with heat exhaustion, which can be dangerous if the victim is operating machinery or injures themselves during the fall. Symptoms are similar to heat stroke, which is a medical emergency. Workers suffering from heat exhaustion should be with removed from the source of heat, provided with fluid and rest.

Heat Stroke

Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. The primary symptoms

- Confusion;
- Irrational behavior;
- Loss of consciousness;
- Convulsions;
- Lack of sweating
- Hot, dry skin;
- Abnormally high body temperature (105.8°F)

If the body temperature rises to high, **death will follow**. The victim should be placed in a shady area, remove outer clothing, wet skin, and increase air movement to improve evaporative cooling. A person might go into shock during heat stroke episode, dial 911 and seek medical assistance for anyone exhibiting these symptoms. No employee should be left alone or sent home without seeking medical attention.

WARNING

Heat stroke is life threatening! Summon emergency services **immediately**! The victim should be cooled down with moist cloths and fanning (do not apply ice.) Administer fluids if the victim is conscious and will accept them. DO NOT administer aspirin, medication, alcohol or stimulants (caffeine/cigarettes).

Chapter
12

PROGRAM EVALUATION

As required by the standard, the employer is required to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly.

Frequency of Written Program Evaluation

The written program will be evaluated annually by the Program Administrator.

Frequency of Respirator Use Area Evaluations

Respirator use areas will be evaluated as determined necessary by the Program Administrator to ensure that the provisions of this program are being effectively implemented and effective. Departments/Divisions may request an evaluation by notifying the Program Administrator.

The Program Administrator will evaluate the effectiveness of the program based on the following:

- Have the contaminants been identified
- How are the concentrations measured
- Has less hazardous chemicals been addressed
- Does the respirator fit the employee without interfering with performance
- Is the employee wearing the correct respirator
- Is maintenance being performed correctly
- Is the respirator clean and stored correctly